ECE 345: Introduction to Control Systems /
ME 380: Analysis and Design of Mechanical Control Systems
Syllabus

Professor Oishi

August 19, 2019

1 Course and Instructor Information

Instructor: Dr. Meeko Oishi, ECE 134C (`oishi@unm.edu`)
   Office hours: Tuesday 12pm-2pm (tentative), and by appointment

TA: Mr. Connor Halsey, TBD (`chalsey@unm.edu`)
   Office hours: Wednesday 4pm-5pm (tentative)

Course Location and Time: Collaborative Teaching and Learning Building (CTLB) 330, Tuesday and Thursday 3:30pm-4:45pm

Prerequisites: ECE students: ECE 314. ME students: Math 316 and ME 357.

1.1 Course Description

ECE 345: Introduction to the feedback control problem. Plant modeling, transfer function and state-space descriptions. Stability criteria. Nyquist and root-locus design. Introduction to analytical design. Z-transforms and digital control. Laboratory design project.

ME 380: System dynamics and modeling; transfer functions; concept of feedback and system stability; transient and steady-state response; control system analysis and design using root locus and frequency response methods. Prerequisites: 357 and MATH 316. Restriction: ME majors, senior standing.

1.2 Required Materials

Textbook: N. Nise, *Control Systems Engineering*, 8th edition, John Wiley & Sons, 2019, or 7th edition, 2015.

Instructional technology: Clickers will be used throughout the term. Please bring your clickers to every class.

Students will need to use Matlab throughout the course, and in particular, in problem sets. Matlab is available in the ECE and ME student clusters.

1.3 Grading

The final grade will be computed via the following weighting.

30%	Final
30%	Midterms (15% each)
15%	Collaborative quizzes (best 4 out of 5)
15%	Problem sets (best 4 out of 5)
10%	Participation

Grade assignment will follow standard fractionated letter grades: $A^+ = 97 - 100$, $A = 94 - 96$, $A^- = 90 - 93$, $B^+ = 87 - 89$, $B = 84 - 86$, $B^- = 80 - 83$, $C^+ = 77 - 79$, $C = 74 - 76$, $C^- = 70 - 73$, $D = 60 - 69$, $F = 0 - 59$.

The participation component of the course will be assessed through completion of clicker questions, contribution to group activities, and completion of learning surveys.

2 Topics Covered

2.1 Course Content and Calendar

Week 1	Introduction, Ch. 1		
Week 2	Modeling – Frequency domain, Ch. 2	Collaborative quiz #0	August 29
Week 3	Modeling – Frequency domain, Ch. 2 & 3	Collaborative quiz #1	September 5
Week 4	Modeling – Time domain, Ch. 3	Problem set #1	September 12
Week 5	Transient response, Ch. 4	Collaborative quiz #2	September 19
Week 6	Transient response, Ch. 4 & 5	Problem set #2	September 26
Week 7	System reduction, Ch. 5	Collaborative quiz #3	October 3
Week 8	System reduction, Ch. 5		
Week 9	Stability, Ch. 6	**Midterm #1**	October 17
Week 10	Stability, Ch. 6	Problem set #3	October 24
Week 11	Steady-state error, Ch. 7	Collaborative quiz # 4	October 31
Week 12	Steady-state error, Ch. 7	Problem set #4	November 7
Week 13	Root locus method, Ch. 8	**Midterm #2**	November 14
Week 14	Root locus method, Ch. 8		
Week 15	Frequency response methods, Ch. 10	Problem set #5	November 26 (Tues)
Week 16	Frequency response methods, Ch. 10	Collaborative quiz #5	December 3 (Tues)

Most of the problem sets are due on Thursdays at the beginning of class. Most of the collaborative quizzes will occur on Thursdays. No class will be held October 10, November 28. The last day of class is December 5. The final exam will occur December 12, 3pm-5pm. The semester starts August 19.

2.2 Late or Missed Work

Final Exam: A passing grade on the final is required to obtain a passing grade for the course.

Midterms: Missed midterms will result in a score of 0. Students who have a legitimate reason for missing a midterm, and communicate with Dr. Oishi *prior* to the midterm, may be able to arrange

an alternative solution. Out of fairness to other students, Dr. Oishi cannot accommodate conflicts that are disclosed *after* the midterm is given in class.

Collaborative Quizzes: Missed collaborative quizzes cannot be made up. If you miss a quiz, you will receive a 0. However, note that all students may drop one score.

Problem Sets: Problem sets are due at the beginning of class. Students are encouraged to work together on problem sets, however each student must hand in their own writeup and Matlab code, individually written. Copying will be considered academic misconduct. Late problem sets are not accepted without Dr. Oishi's permission. Note that all students may drop one score.

Academic Honesty: *Students are responsible for all academic integrity policies, including adhering to prescribed resources during exams and quizzes.*

2.3 Expectations for Student Conduct

Students are expected to participate fully in class exercises and group work. For group activities that require pre-class work, students are expected to come to class prepared, with the assigned pre-class work completed.

Written work (exams, problem sets, collaborative quizzes) must be legible and clear. Students are expected to practice good writing and organization.

As a courtesy to other students, please turn off cell phones during class.

All course updates will be posted on the course website. Please check back often for the most current information.

2.4 Getting Help and Asking Questions

Course lectures will incorporate active learning techniques that are designed to help students assess their own learning, and to facilitate learning via multiple learning styles. There will be opportunities to anonymously ask questions in class. Students are always welcome to drop in at Dr. Oishi's office hours or the TA's office hours with any questions or concerns, or to make an appointment to meet with Dr. Oishi.

3   UNM Disclaimer

Attendance Policy

Regular and punctual attendance is required. UNM Pathfinder policies apply, which in part means instructor drops based on non-attendance are possible. This policy applies regardless of the grading option you have chosen.

Accommodation Statement

Accessibility Services (Mesa Vista Hall 2021, 277-3506) provides academic support to students who have disabilities. If you think you need alternative accessible formats for undertaking and completing coursework, you should contact this service right away to assure your needs are met in a timely manner. If you need local assistance in contacting Accessibility Services, see the Bachelor and Graduate Programs office.

Academic Integrity

The University of New Mexico believes that academic honesty is a foundation principle for personal and academic development. All University policies regarding academic honesty apply to this course. Academic dishonesty includes, but is not limited to, cheating or copying, plagiarism (claiming credit for the words or works of another from any type of source such as print, Internet or electronic database, or failing to cite the source), fabricating information or citations, facilitating acts of academic dishonesty by others, having unauthorized possession of examinations, submitting work of another person or work previously used without informing the instructor, or tampering with the academic work of other students. The University's full statement on academic honesty and the consequences for failure to comply is available in the college catalog and in the Pathfinder.

Cell Phones and Technology

As a matter of courtesy, please turn off cell phones, pagers, and other communication and entertainment devices prior to the beginning of class. Notify the instructor in advance if you are monitoring an emergency, for which cell phone ringers should be switched to vibrate.